



Communicating Tropical Risk in the Mid-Atlantic

Emergency Management and Broadcast Media Workshop
October 16-17, 2014

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Pre-Mortem



STOP

- Imagine a hurricane in the Mid-Atlantic area. While the hurricane is under control, the majority of the population was the result of the expected. **What a disaster could have gone wrong.**
- In one minute as many possible failures as you can think of on the piece were given.

10 Seconds

Topics

- What is the National Hurricane Center (NHC)?
- Resources and Products from NHC
- Local Products
- Changes for 2015 Season
- Potential Hurricane Impacts in the Mid-Atlantic

National Weather Service

NWS National Hurricane Center

Miami, FL

Forecasts the **track**

Forecasts the **intensity**

All tropical cyclones around North America!



Building has 10-inch thick walls made from 3000 cubic yards of concrete, reinforced with 45 miles of steel reinforcing rods

NWS Forecast Office

Sterling, VA

Forecasts the **impacts**

Forecast the **threats**

For everyone in our local area



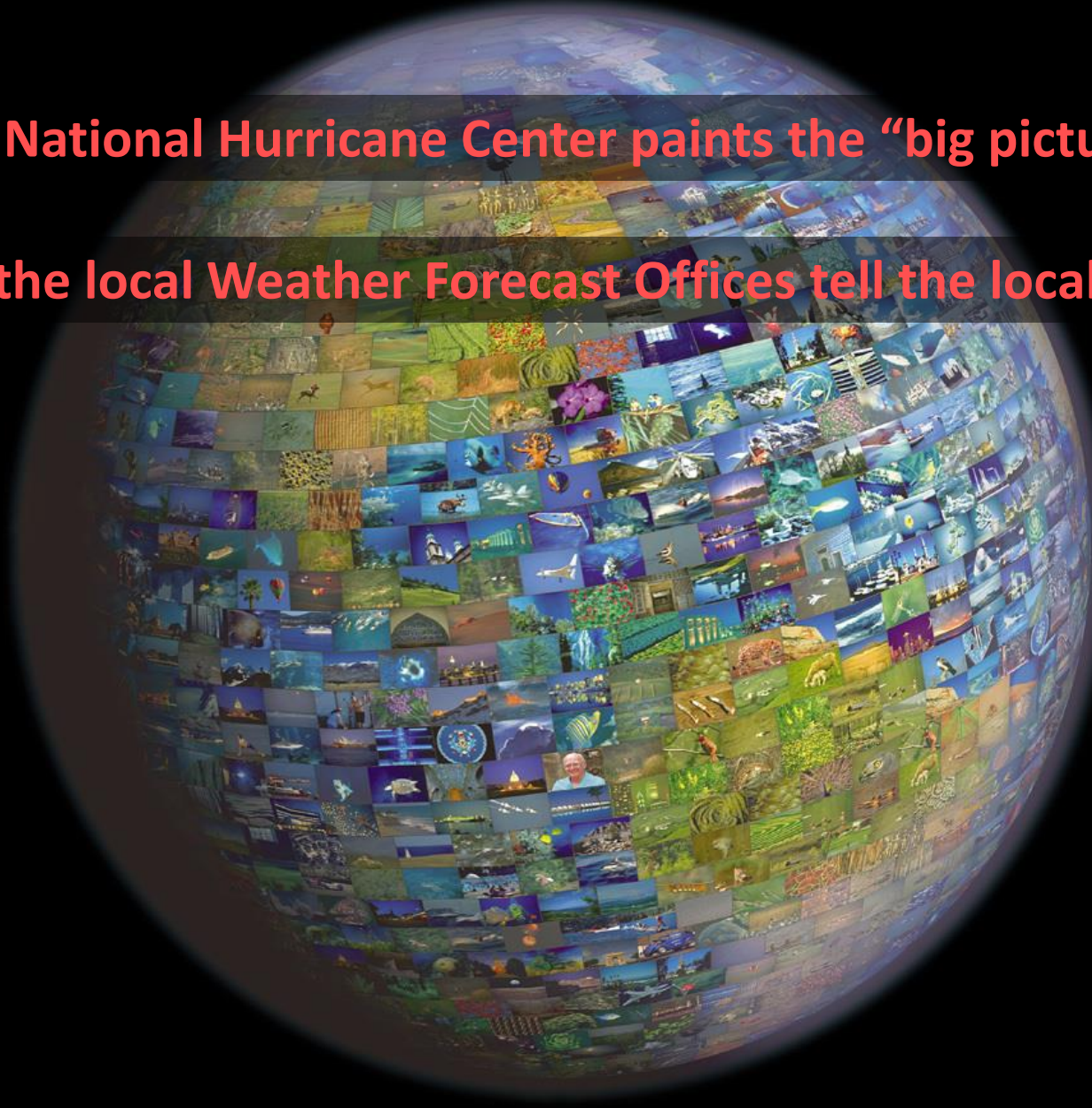
We work together!

To decide where & when
to issue WATCHES & WARNINGS

National Weather Service hurricane forecast and warning products are like a mosaic...

The National Hurricane Center paints the “big picture”...

and the local Weather Forecast Offices tell the local story





NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

[HOME](#)[FORECAST](#)[PAST WEATHER](#)[WEATHER SAFETY](#)[INFORMATION CENTER](#)[NEWS](#)[SEARCH](#)[ABOUT](#)

Local forecast by
"City, St" or ZIP code

[Location Help](#)

Customize Your Weather.gov

Enter Your City, ST or
ZIP Code

☐ Remember Me[Privacy Policy](#)

News Headlines

- Starting December 3, 2014, more geographically-precise watches, warnings, and advisories will be issued for the western and northern metropolitan areas of Baltimore and Washington, and the Blue Ridge Mountains in central and northern Virginia.

Tropical Weather

[Weather.gov](#) > [Sterling, VA](#) > Tropical Weather

Sterling, VA

Weather Forecast Office

[Current Hazards](#)[Current Conditions](#)[Radar](#)[Forecasts](#)[Rivers and Lakes](#)[Climate and Past Weather](#)[Local Programs](#)[Satellite](#)[Tracking
Maps](#)[Historical
Data](#)[Preparedness](#)[National
Hurricane Center](#)[NOAA
Hurricane
Page](#)[Storm
Names](#)[Impact
Graphics](#)[NATIONAL HURRICANE CENTER](#)[Latest NOAA Atlantic Hurricane Season Outlook](#)[Latest WFO Baltimore/Washington Local Hurricane Statement](#)

Local Hurricane Statements are issued when a tropical system is forecast to impact all or part of the Baltimore/Washington Forecast Office's [County Warning Area](#).



2-Day Graphical Tropical Weather Outlook

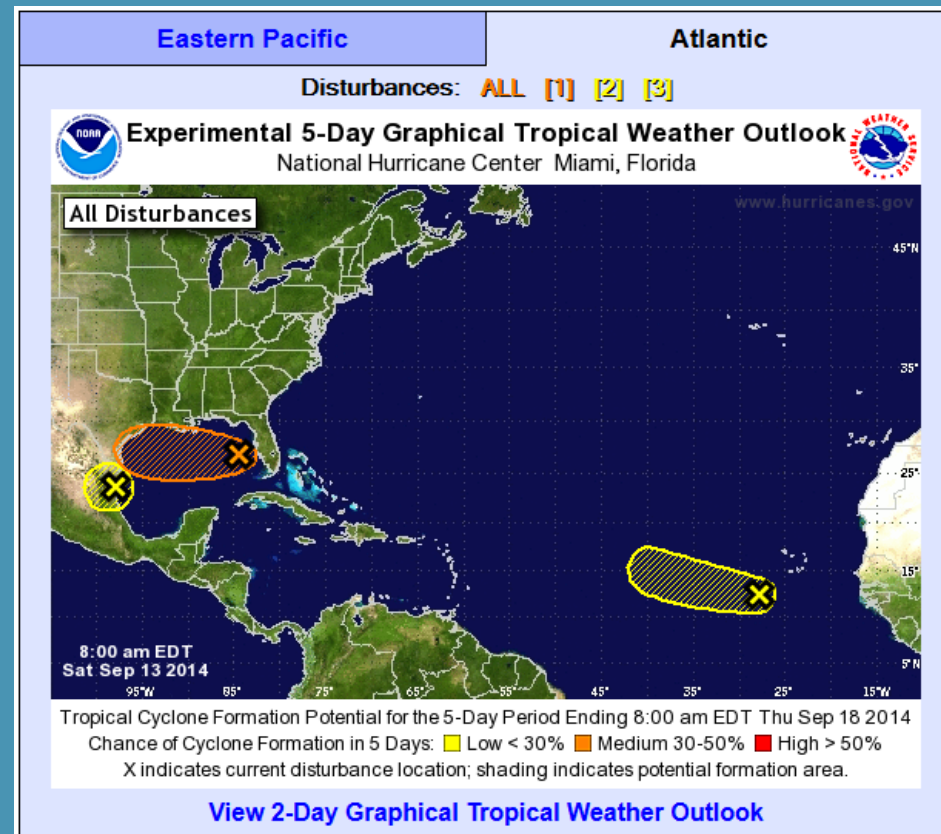
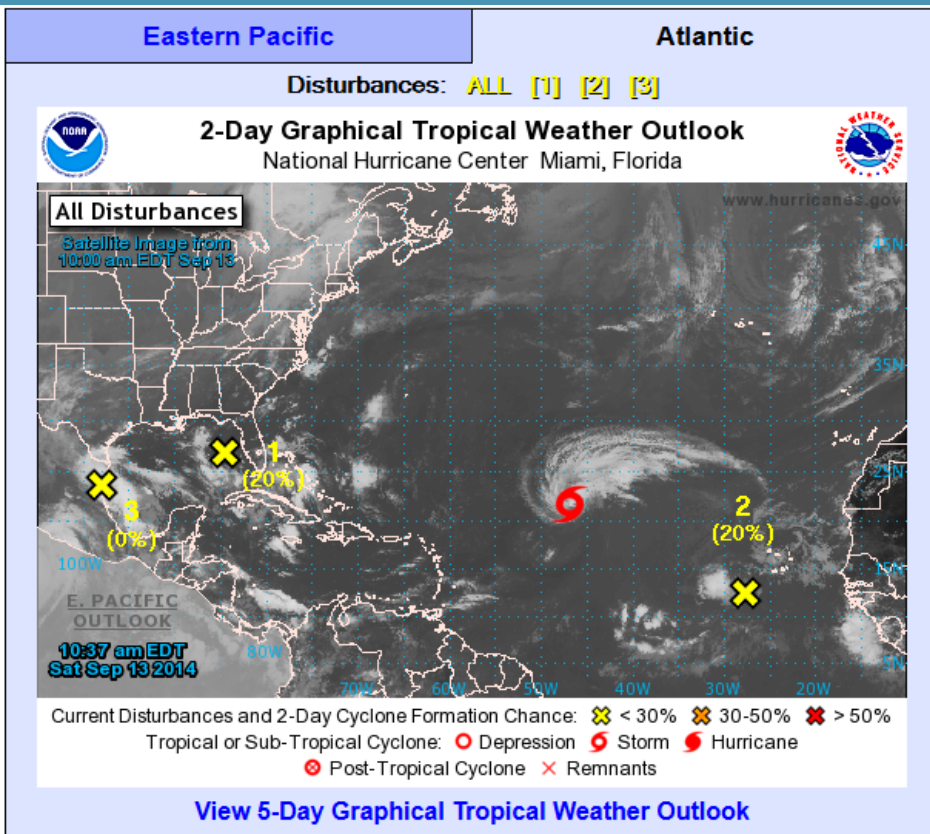
National Hurricane Center Miami, Florida



Resources from NHC

(available through our EM briefing page)

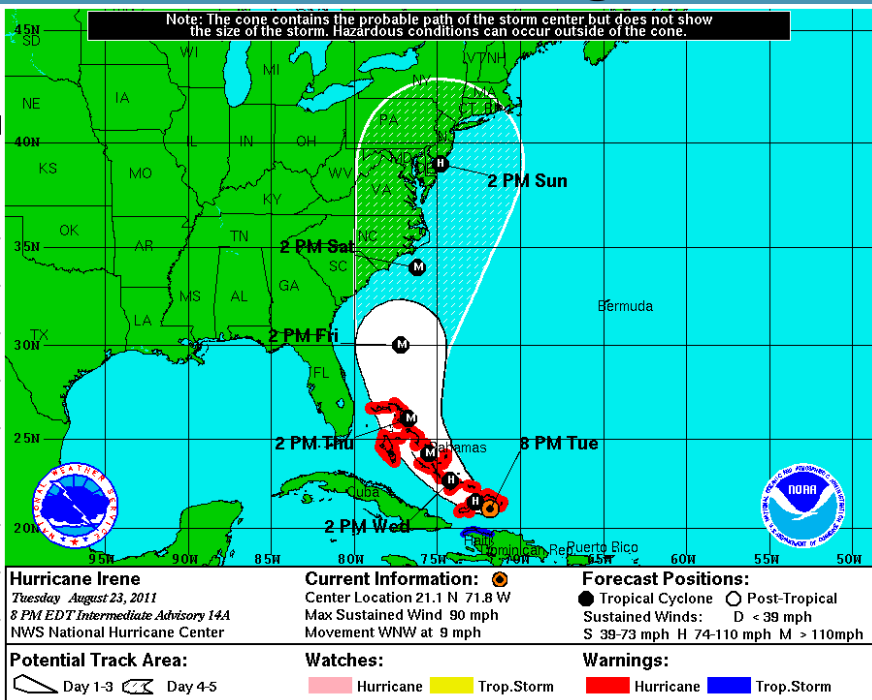
- Graphical Tropical Weather Outlook



Resources from NHC

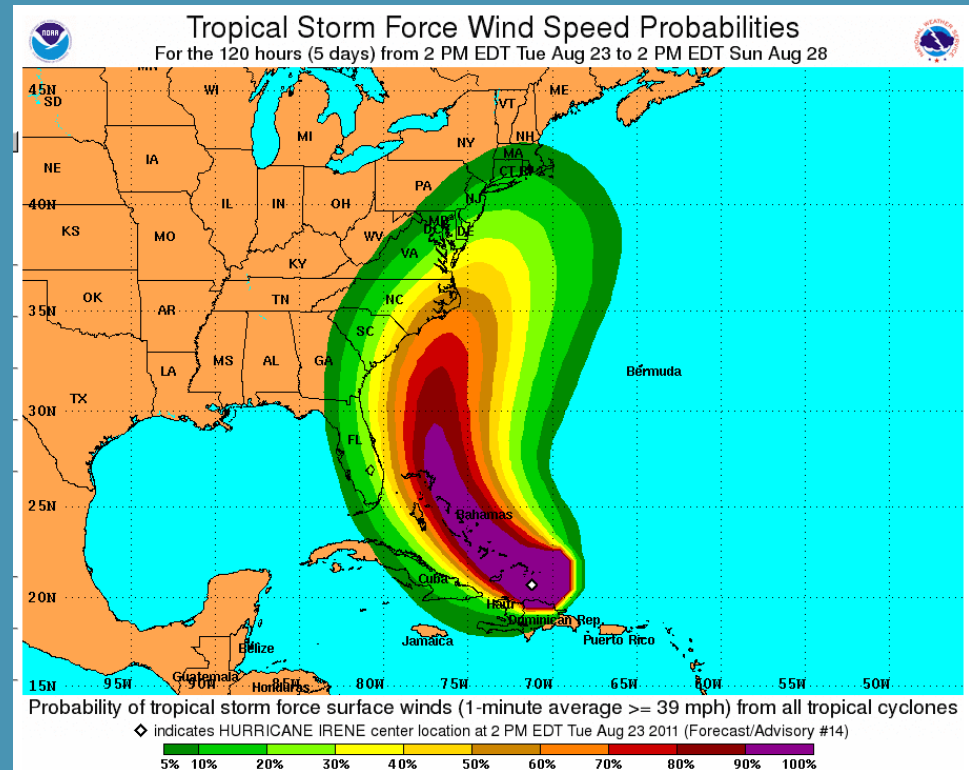
(available through our EM briefing page)

- Tropical Cyclone Track Forecast Cone and Watches/Warnings



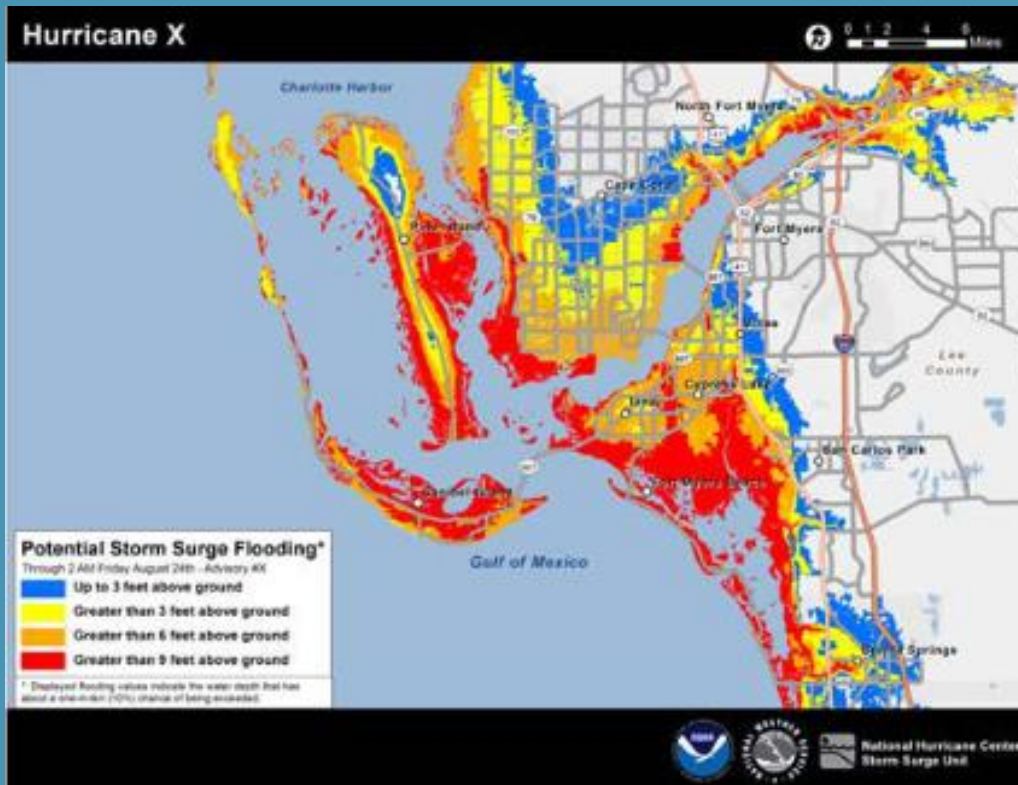
– **NOTE: Tropical Storms and Hurricanes are not points!**

- Wind Speed Probabilities...
exceeding several thresholds
(34, 50, 64 kt)



Resources from NHC

(available through our EM briefing page)



- Potential Storm Surge Flooding Map
 - New for 2014
 - 10% exceedance
 - Height above ground
 - Issued after 1st Hurricane (or Tropical Storm) Watch is issued

Resources from NHC

(available through our EM briefing page)

Forecast Advisory

Source of info for:

- Watches and warnings
- Center location
- Motion
- Strength
- Size
- Forecast positions, intensity, and size

ZCZC MIATCPAT4 ALL
TTAA00 KNHC DDHMM

BULLETIN
HURRICANE IRENE ADVISORY NUMBER 14
NWS NATIONAL HURRICANE CENTER MIAMI FL AL092011
500 PM EDT TUE AUG 23 2011

...IRENE LASHING THE TURKS AND CAICOS ISLANDS...

SUMMARY OF 500 PM EDT...2100 UTC...INFORMATION

LOCATION...20.9N 71.5W
ABOUT 50 MI...80 KM SSW OF GRAND TURK ISLAND
ABOUT 110 MI...180 KM E OF GREAT INAGUA ISLAND
MAXIMUM SUSTAINED WINDS...90 MPH...150 KM/H
PRESENT MOVEMENT...WNW OR 295 DEGREES AT 9 MPH...15 KM/H
MINIMUM CENTRAL PRESSURE...976 MB...28.82 INCHES

WATCHES AND WARNINGS

CHANGES IN WATCHES AND WARNINGS WITH THIS ADVISORY...

THE HURRICANE WATCH FOR THE NORTH COAST OF HAITI HAS BEEN
DISCONTINUED.

THE GOVERNMENT OF THE DOMINICAN REPUBLIC HAS DISCONTINUED THE
TROPICAL STORM WARNING FOR THE NORTH COAST OF THE DOMINICAN
REPUBLIC.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT...

A HURRICANE WARNING IS IN EFFECT FOR...

- * TURKS AND CAICOS ISLANDS
- * THE SOUTHEASTERN...CENTRAL...AND NORTHWESTERN BAHAMAS

A TROPICAL STORM WARNING IS IN EFFECT FOR...

- * NORTH COAST OF HAITI FROM LE MOLE ST. NICHOLAS EASTWARD TO THE
DOMINICAN REPUBLIC BORDER

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR
PRODUCTS ISSUED BY YOUR NATIONAL METEOROLOGICAL SERVICE.



But what about locally?

Local Products

- Hurricane Local Statement (HLS)
 - Active whenever Tropical Watches/Warnings are in effect locally
 - Will be issued ASAP after each NHC advisory
 - Once conditions affecting local area, updates will come every 2-3 hours
 - Segmented (Overview and VTEC sections)

Hurricane Local Statement

Overview

- Headlines
- New Information
- Area affected
- Watches/warnings
- Storm information
- Situation overview
- Precautionary preparedness actions
- Next update

Zone Forecasts

- Headlines
- New Information
- Precautionary preparedness actions
- Probability tropical storm/hurricane conditions
- Impacts
- Winds (and seas)
- Storm surge & tide
- Inland flooding
- Tornadoes (waterspouts)
- Non-specific

Changes for 2015

- HLS will return to a non-segmented format, eliminating the zone forecast section
- TCV will become the local tropical zone forecast product
- Storm Surge Watch/Warning Product
- Local Impact graphics will become operational

New HLS Format

- Information pulled from both NHC and local forecasts
- Largely automated, but with increased opportunity for forecaster enhancement
- Uncertainty wording
- Order based on largest expected impact

...STORM SURGE AND STORM TIDE...
A STORM SURGE OF 1 TO 3 FEET IS EXPECTED SATURDAY AND SATURDAY NIGHT. THIS COULD RESULT IN MINOR TO MODERATE COASTAL FLOODING AT THE TIME OF HIGH TIDE.

Different storms, focus on format!

OLD

NEW

* SURGE:
LIFE-THREATENING STORM SURGE IS POSSIBLE ACROSS PORTIONS OF COASTAL COLLIER, MAINLAND MONROE, BROWARD, PALM BEACH, AND MIAMI DADE COUNTIES. THIS MEANS THE POTENTIAL FOR:

- STRUCTURAL DAMAGE FROM SEA WATER.
- SEVERE BEACH EROSION.
- SECTIONS OF NEAR-SHORE ROADS WASHED OUT.
- LOW-LYING ESCAPE ROUTES SEVERELY FLOODED.
- STRUCTURAL DAMAGE TO SHORELINE BUILDINGS, WITH A FEW WASHING INTO THE SEA.
- DAMAGE COMPOUNDED BY FLOATING DEBRIS.
- DAMAGE TO MARINAS, DOCKS, AND PIERS.
- MANY SMALL CRAFT BROKEN AWAY FROM MOORINGS, ESPECIALLY IN UNPROTECTED ANCHORAGES, LIFTED ONSHORE AND STRANDED.

IN MIAMI DADE TO PALM BEACH COUNTIES THE THREAT IS MOSTLY CONFINED TO BARRIER ISLAND AND AREAS IMMEDIATELY ADJACENT TO THE COAST/INSTRACOASTAL EAST OF U.S. 1.

IT IS TOO EARLY TO PROVIDE SPECIFIC INFORMATION BUT ALONG COASTAL COLLIER AND MAINLAND MONROE THERE IS A POTENTIAL FOR LIFE THREATENING SURGE PENETRATING MILES INLAND.

New WFO TCV (TC VTEC = Zone forecasts)

- New product header
- Tropical headlines
- Hazard definition when hazards are NEW
- Locations in this segment
- Winds, surge, rainfall, tornado details and impacts
- Zone/county websites



* FOR MORE INFORMATION

- LOCAL EVACUATION AND SHELTERING: MIAMI-DADE COUNTY EMERGENCY MANAGEMENT
 - [HTTP://WWW.MIAMIDADE.GOV/EMERGENCY/](http://www.miamidade.gov/emergency/)
- FAMILY EMERGENCY PLANS: FEDERAL EMERGENCY MANAGEMENT AGENCY
 - [HTTP://READY.GOV/](http://ready.gov/)
- LOCAL WEATHER CONDITIONS AND FORECASTS: NWS MIAMI FLORIDA
 - [HTTP://WWW.SRH.NOAA.GOV/MFL/](http://www.srh.noaa.gov/mfl/)

WTUS82 KMFL DDHMM
TCVMFL

URGENT - IMMEDIATE BROADCAST REQUESTED

JOSEPHINE LOCAL WATCH/WARNING STATEMENT/INTERMEDIATE ADVISORY NUMBER 12A
NATIONAL WEATHER SERVICE MIAMI FL AL012009
1107 AM EDT FRI SEP 29 2009

FLZ173-292315-
/O.NEW.KMFL.HU.W.1001.000000T0000Z-000000T0000Z/
/X.NEW.KMFL.SS.A.1001.000000T0000Z-000000T0000Z/
COASTAL MIAMI DADE-
1107 AM EDT FRI SEP 29 2009

...HURRICANE WARNING IN EFFECT...

...STORM SURGE WATCH IN EFFECT...

A HURRICANE WARNING MEANS HURRICANE WIND CONDITIONS ARE EXPECTED SOMEWHERE WITHIN THIS AREA AND WITHIN THE NEXT 36 HOURS

A STORM SURGE WATCH MEANS LIFE THREATENING INUNDATIONS LEVELS ARE POSSIBLE SOMEWHERE WITHIN THIS AREA AND WITHIN THE NEXT 48 HOURS

* LOCATIONS AFFECTED

- MIAMI BEACH
- DOWNTOWN MIAMI

* WIND

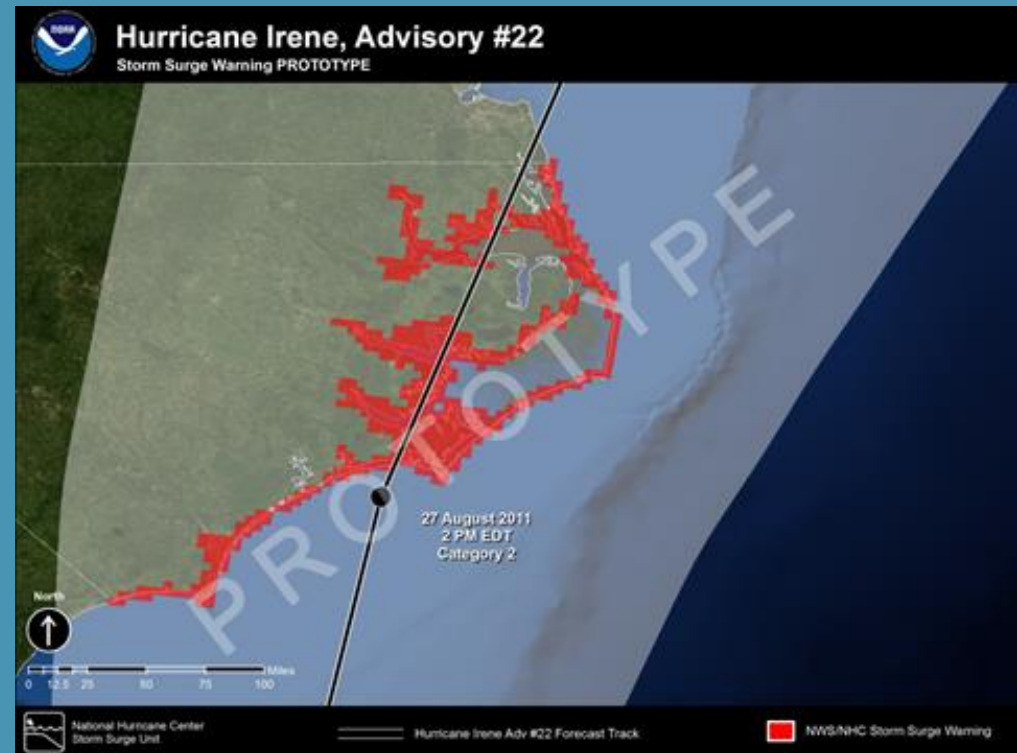
- **LATEST LOCAL FORECAST: EQUIVALENT CAT 1 HURRICANE FORCE WIND**
 - PEAK WIND FORECAST: 65-85 MPH WITH GUSTS TO 110 MPH
 - WINDOW FOR TROPICAL STORM FORCE WINDS: SATURDAY AFTERNOON THROUGH SUNDAY EVENING
 - WINDOW FOR HURRICANE FORCE WINDS: SATURDAY EVENING THROUGH EARLY SUNDAY MORNING
- **THREAT TO LIFE AND PROPERTY: EXTREME**
 - THREAT TREND: LITTLE CHANGE FROM PREVIOUS FORECAST
 - MAKE PLANS: FOR CHANCE THAT WIND COULD LOCALLY REACH MAJOR HURRICANE FORCE; ENACT YOUR EMERGENCY ACTION PLAN ACCORDINGLY
 - TAKE ACTION: FOR EXTREMELY DANGEROUS AND LIFE THREATENING WIND TO POSSIBLY OCCUR; FAILURE TO ACT MAY RESULT IN INJURY OR LOSS OF LIFE
 - PREPARE: AGGRESSIVELY FOR CHANCE OF DEVASTATING TO CATASTROPHIC WIND IMPACTS BASED ON THREAT ASSESSMENT THAT CONSIDERS PLAUSIBLE WORST CASE SCENARIO FOR SAFETY

- **POTENTIAL IMPACTS (FOR PLAUSIBLE WORST CASE): DEVASTATING**

- WIDESPREAD POWER OUTAGES WITH SOME AREAS EXPERIENCING LONG-TERM OUTAGES
- MANY BRIDGES AND ACCESS ROUTES CONNECTING BARRIER ISLANDS IMPASSABLE
- STRUCTURAL CATEGORY TO STURDY BUILDINGS WITH SOME HAVING COMPLETE WALL AND ROOF FAILURES
- COMPLETE DESTRUCTION OF MOBILE HOMES
- NUMEROUS ROADS IMPASSABLE FROM LARGE DEBRIS

Storm Surge Watch/Warning Product Background

- Storm Surge is responsible for the majority of deaths associated with tropical cyclones
- NWS does not currently issue warnings for surge as it has been implicitly contained within the “Hurricane Warning” or “Tropical Storm Warning”
- Experimental in Tropical Season 2015

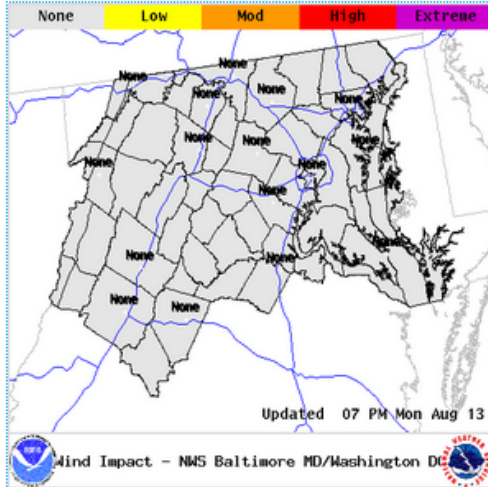


Local products

Baltimore/Washington Tropical Cyclone Impact Graphics

Experimental

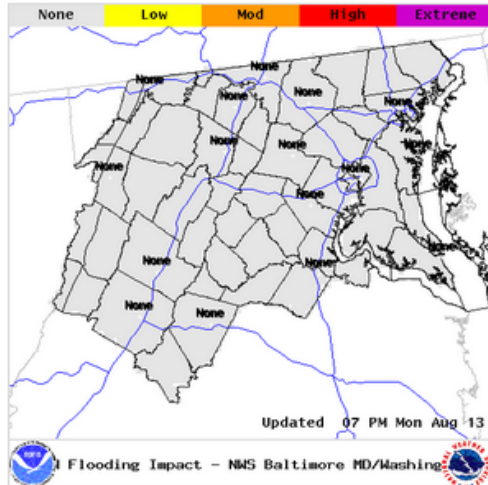
WIND HAZARD



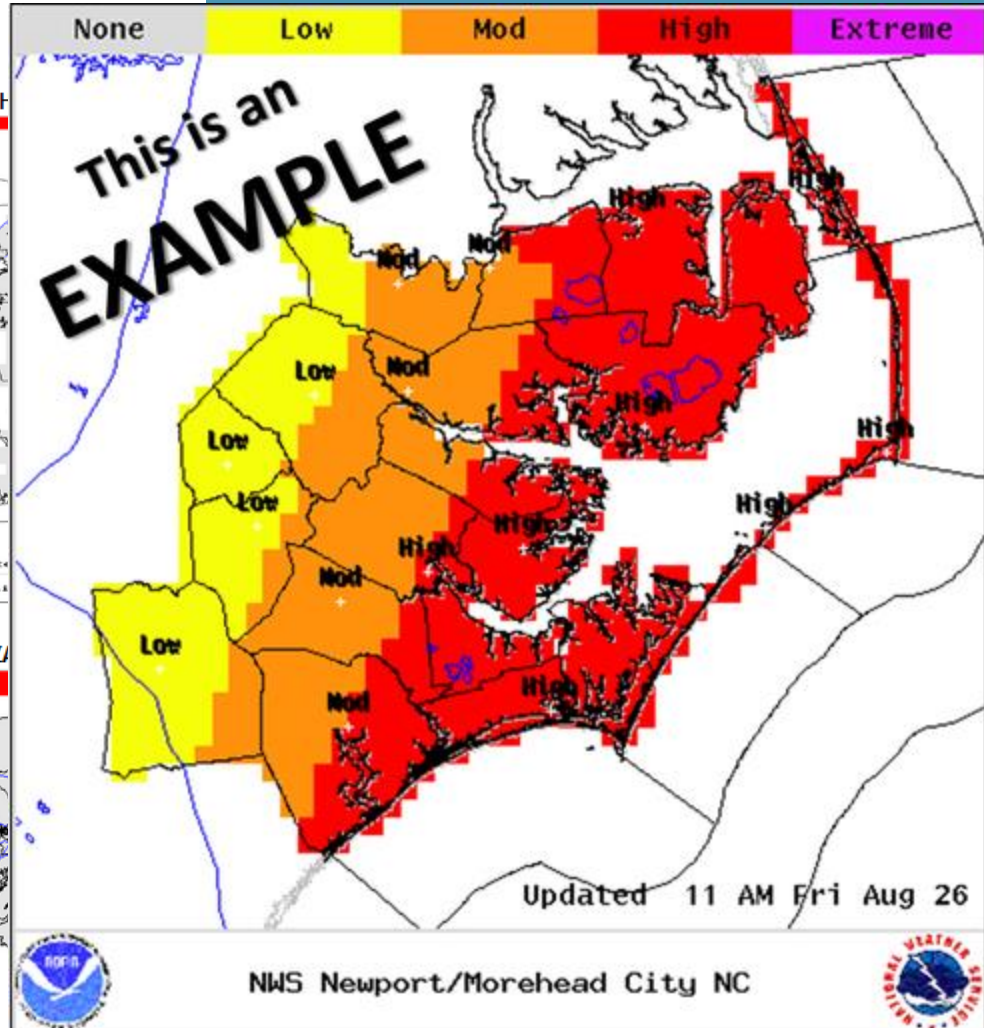
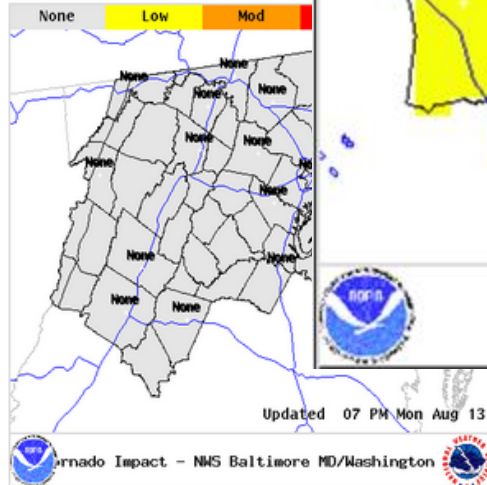
COASTAL FLOOD HAZARD



INLAND FLOOD HAZARD



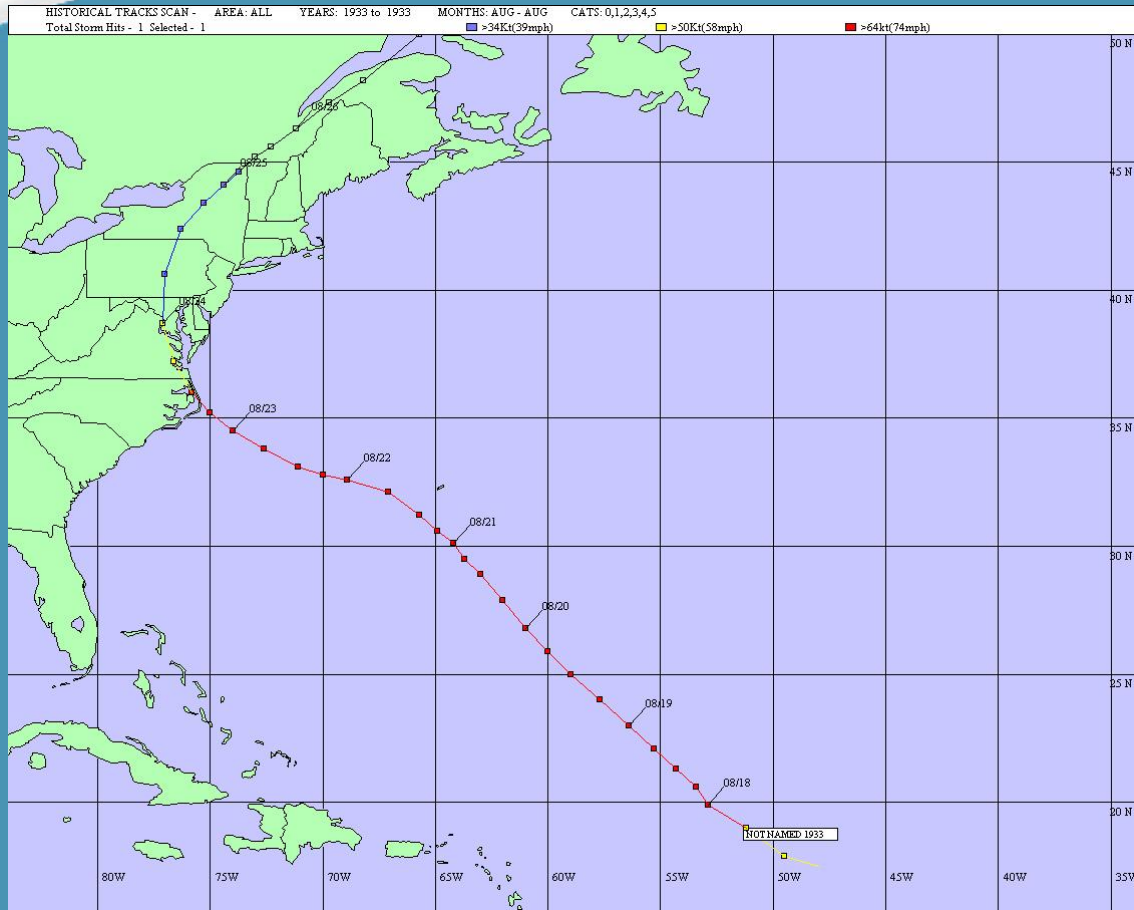
TORNADO HAZARD



Worst Case Scenario

- Past storms highlight all of impacts that the Mid-Atlantic faces from tropical systems or their remnants
 - Sandy (2012) – rainfall, winds, snow in the mountains
 - Lee (2011) -- rainfall & flooding
 - Irene (2011) -- rainfall & flooding, winds
 - Hanna (2008) – rainfall & flooding
 - Ernesto (2006) -- winds, storm surge
 - Jeanne (2004) – rainfall & flooding
 - Ivan (2004) -- tornadoes
 - Isabel (2003) -- storm surge, fresh water flooding, river flooding, high winds

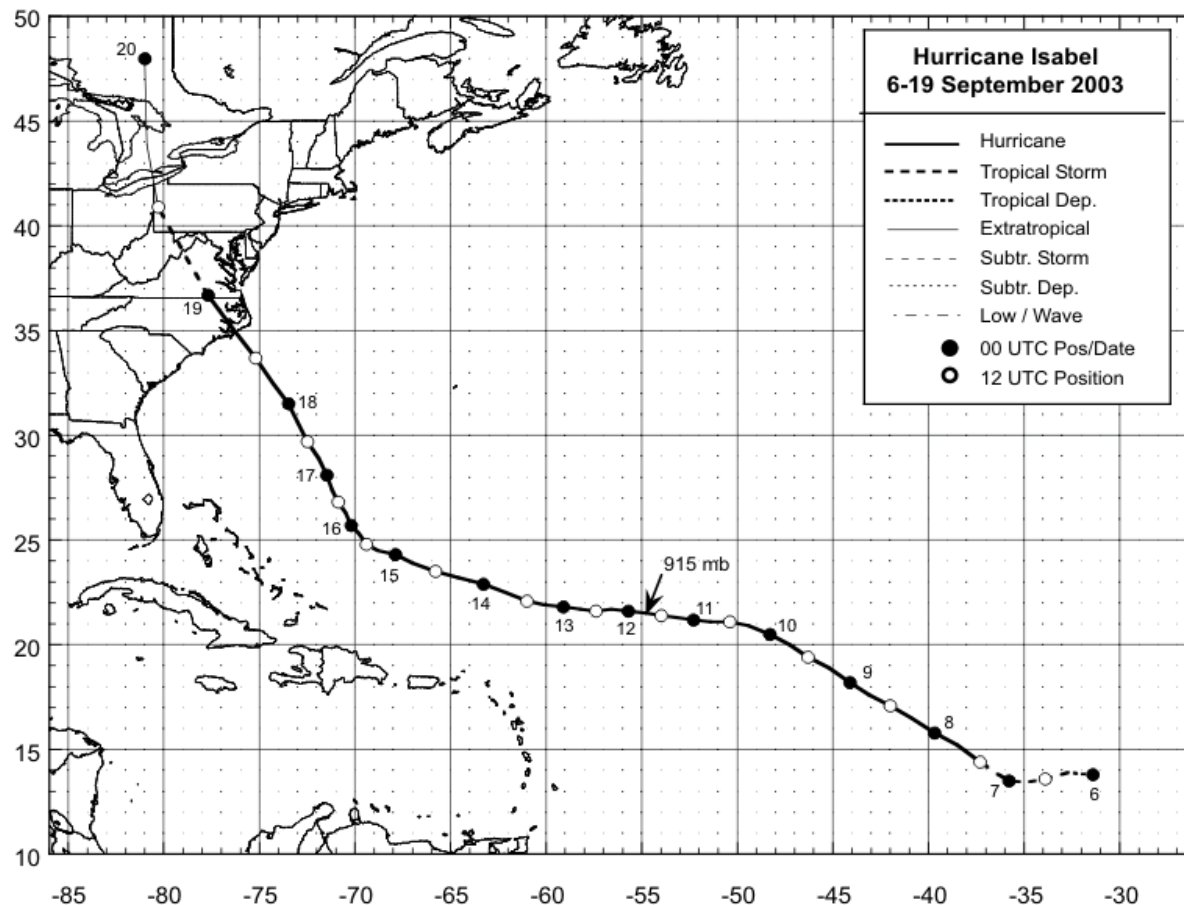
Storm Surge



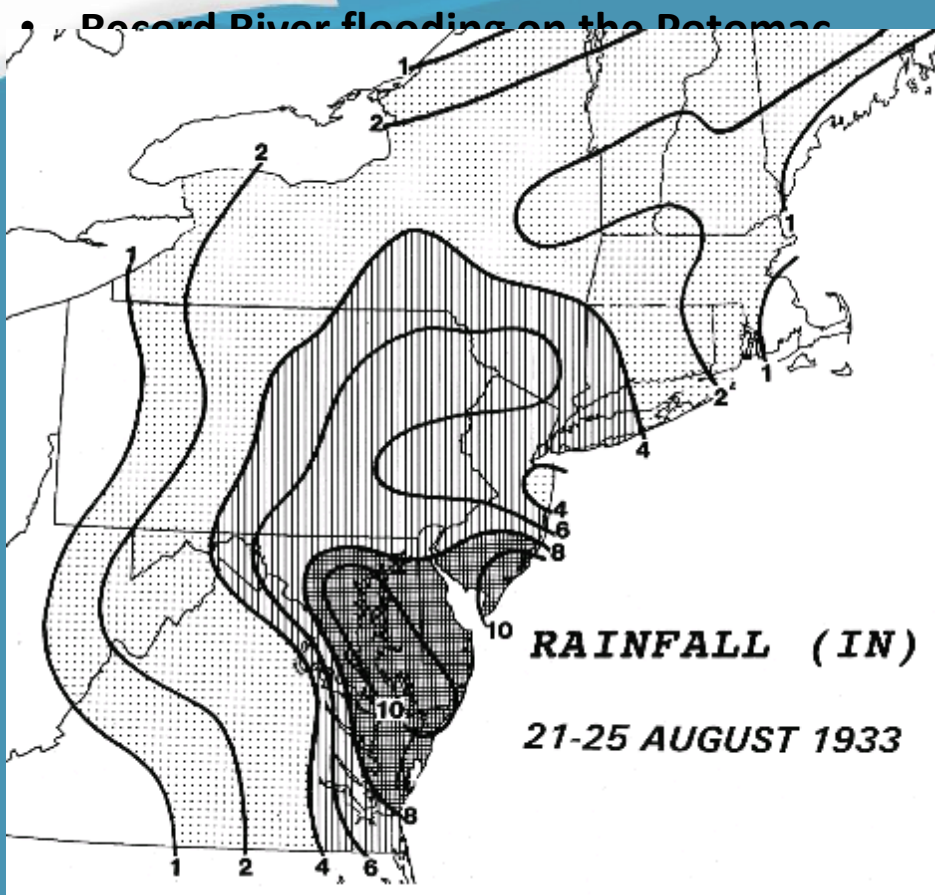
- Only Tropical Storm after landfall
- 11 ft. storm surge at DC, 12 ft. at Alexandria. Baltimore and Annapolis saw water levels similar to those from Isabel.

Chesapeake-Potomac Hurricane of 1933

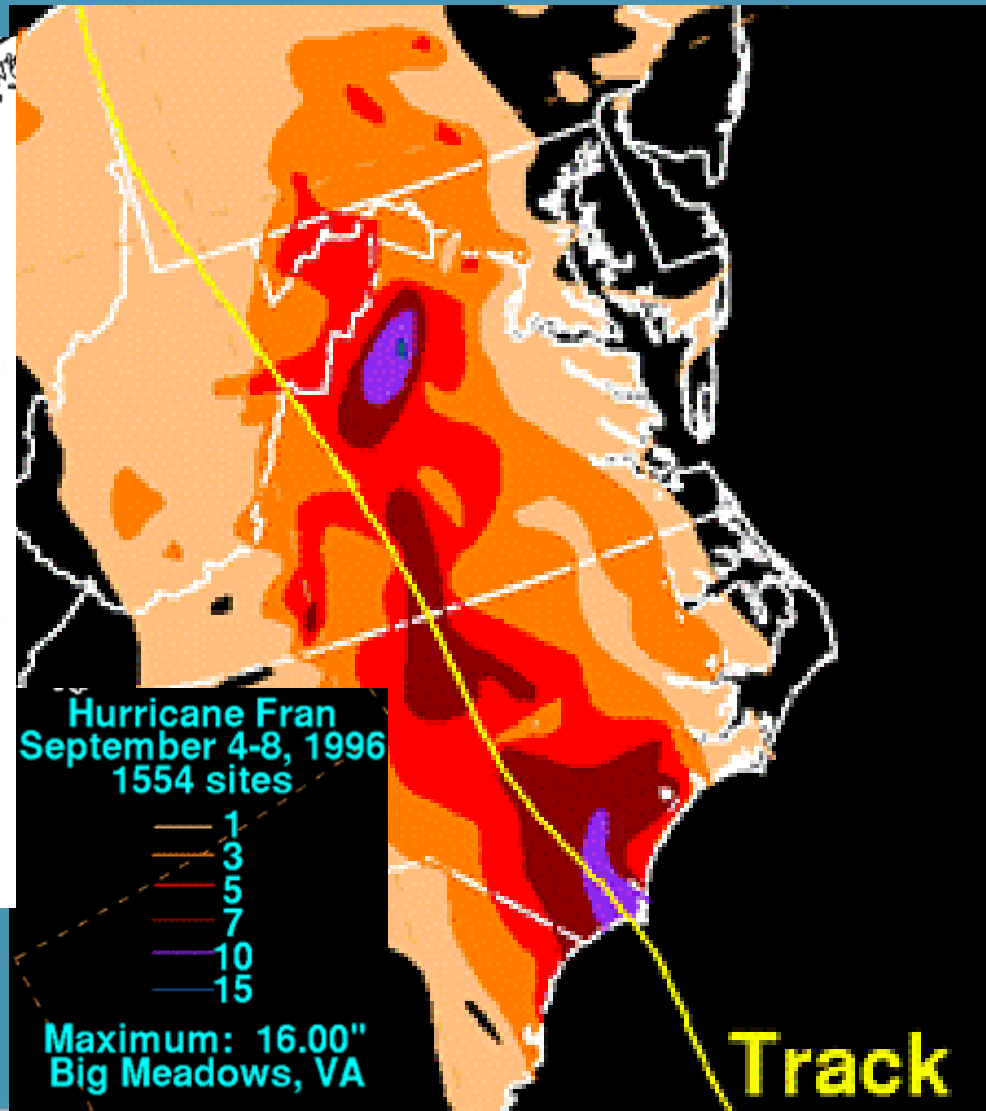
Tropical Storm Isabel



Inland Flooding



...killed 6 people. Over 100 people were rescued from flood waters. 560 thousand people in Virginia experienced power outages.



Wind

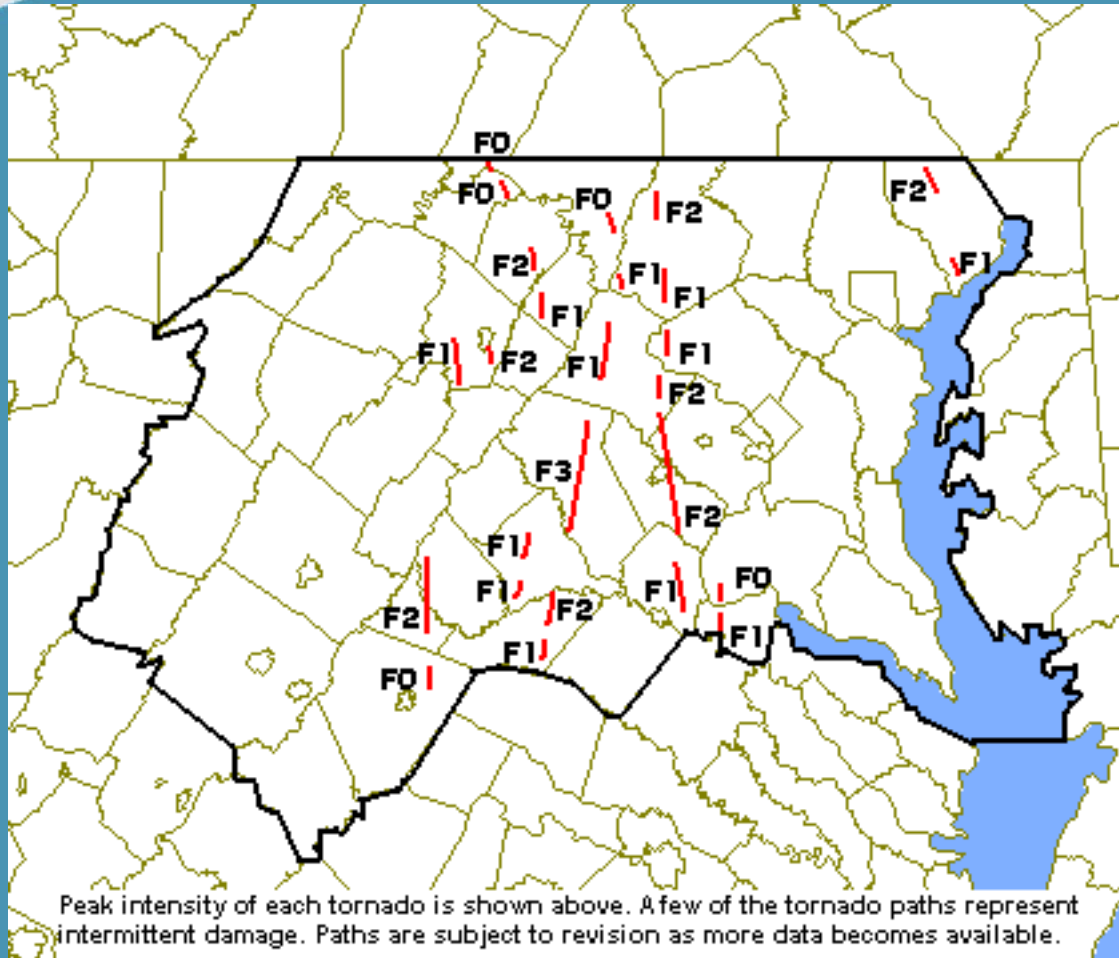
Floyd (1999)

- Gusts 50-70 MPH
- Virginia, there were 280,000 people without power MD 250 k w/o

Irene (2011)

- Gusts 50 - 65 MPH along and east of the I-95 corridor, over 70 on the MD portion of the Bay
- Fallen trees damaged nearly 1,000 homes primarily across southern Maryland. Nearly 2.5 million power outages in Virginia, and around 850,000 in Maryland and the District of Columbia

Tornadoes



- Remnants of Ivan (2004)
- 117 tornadoes over a 3 day period in US
- 37 tornadoes in Virginia
- 6 in Maryland
- 3 in West Virginia
- Tornado Watch was in effect

Now Back to the Pre-Mortem

- After seeing the resources available to you, do you still have any concerns?
- Are there any of your potential problems that you still feel need to be discussed?



Questions?



Extras

New WFO TCV

* STORM SURGE

- **LATEST LOCAL FORECAST: LIFE-THREATENING STORM SURGE INUNDATION**
 - PEAK STORM SURGE INUNDATION: 5 TO 7 FEET ABOVE GROUND SOMEWHERE WITHIN SURGE PRONE AREAS
 - WINDOW FOR STORM SURGE INUNDATION: SUNDAY MORNING THROUGH SUNDAY NIGHT
- **THREAT TO LIFE AND PROPERTY: HIGH**
 - THREAT TREND: AN INCREASE IN PEAK STORM SURGE FROM PREVIOUS FORECAST
 - TAKE ACTION: FOR VERY DANGEROUS AND LIFE THREATENING STORM SURGE FLOODING TO POSSIBLY OCCUR; FAILURE TO ACT MAY RESULT IN SIGNIFICANT LOSS OF LIFE
 - PREPARE: AGGRESSIVELY FOR CHANCE OF EXTENSIVE STORM SURGE IMPACTS BASED ON THREAT ASSESSMENT THAT CONSIDERS PLAUSIBLE WORST CASE SCENARIO FOR SAFETY
- **POTENTIAL IMPACTS (FOR PLAUSIBLE WORST CASE): EXTENSIVE**
 - STRUCTURES: MAJOR STRUCTURAL CATEGORY TO SHORELINE BUILDINGS FROM OCEAN WATER AND BATTERING WAVES; SOME WASHED INTO THE SEA
 - ROADS: SECTIONS OF ROADS AND LOW-LYING ESCAPE ROUTES SEVERELY FLOODED OR WASHED OUT
 - BEACHES: SEVERE BEACH EROSION; POSSIBLE NEW CUTS; EXTREME RIP CURRENTS
 - MARINE: MAJOR CATEGORY TO NEARBY PORTS, DOCKS, AND MARINAS; MANY SMALL CRAFT BROKEN AWAY FROM MOORINGS; SOME LIFTED AND STRANDED INLAND

* FLOODING RAIN

- **LATEST LOCAL FORECAST: FLASH FLOOD WATCH IN EFFECT**
 - PEAK RAINFALL AMOUNTS: 4-8 INCHES
- **THREAT TO LIFE AND PROPERTY (WITH SAFETY MARGIN): MODERATE**
 - MAKE PLANS FOR DANGEROUS FLOODING TO POSSIBLY OCCUR IN SEVERAL LOCATIONS AND BECOME LIFE THREATENING
 - TAKE ACTION FOR CHANCE OF HEAVY RAIN WHERE HIGHEST TOTALS COULD LOCALLY EXCEED AMOUNTS CONDUCIVE FOR MODERATE FLASH FLOODING AND/OR RAPID INUNDATION
 - PREPARE FOR THE CHANCE OF SIGNIFICANT IMPACTS BASED ON FLOODING RAIN THREAT ASSESSMENT THAT CONSIDERS FORECAST UNCERTAINTY
- **POTENTIAL IMPACTS (FOR PLAUSIBLE WORST CASE): SIGNIFICANT**
 - ANY FLOODING WILL ADD DIFFICULTIES TO RESCUE AND RECOVERY OPERATIONS
 - SEVERAL AREAS WITH WATER ENTERING HOMES AND BUSINESSES
 - FLOODING OF SEVERAL PRIMARY/SECONDARY ROADS AND OVERFLOW CANALS

* TORNADO

- **LATEST LOCAL FORECAST: TORNADO WATCH NOT EXPECTED**
 - ISOLATED TORNADOES POSSIBLE WITHIN RAINBANDS BEFORE ARRIVAL OF HIGH WINDS
- **THREAT TO LIFE AND PROPERTY (INCLUDES SAFETY MARGIN): ELEVATED**
 - THE NEARBY OCCURRENCE OF ANY TORNADO IS LIFE THREATENING
 - TAKE ACTION FOR CHANCE OF ISOLATED TORNADOES GENERALLY SMALL AND SHORT-LIVED
 - PREPARE FOR THE CHANCE OF LIMITED IMPACTS BASED ON TORNADO THREAT ASSESSMENT THAT CONSIDERS FORECAST UNCERTAINTY
- **POTENTIAL IMPACTS (FOR PLAUSIBLE WORST CASE): LIMITED**
 - SOME LOCAL DISRUPTIONS TO EVACUATION AND OUTDOOR PREPAREDNESS ACTIVITIES
 - PARTICULAR CONCERN FOR MOBILE HOME RESIDENTS, MOTORISTS, AND MARINERS

* FOR MORE INFORMATION

- **LOCAL EVACUATION AND SHELTERING: MIAMI-DADE COUNTY EMERGENCY MANAGEMENT**
 - [HTTP://WWW.MIAMIDADE.GOV/EMERGENCY/](http://www.miamidade.gov/emergency/)
- **FAMILY EMERGENCY PLANS: FEDERAL EMERGENCY MANAGEMENT AGENCY**
 - [HTTP://READY.GOV/](http://ready.gov/)
- **LOCAL WEATHER CONDITIONS AND FORECASTS: NWS MIAMI FLORIDA**
 - [HTTP://WWW.SRH.NOAA.GOV/MFL/](http://www.srh.noaa.gov/mfl/)

Impact graphics

Extreme

Potential for Extreme Impact: Catastrophic wind damage. Significant damage possible to even well-constructed buildings. Destruction of many poorly constructed buildings such as mobile homes and barns. Most roads impassable due to wind-blown debris. Property damage in the millions of dollars.

High

Potential for High Impact: Widespread wind damage. Many large trees uprooted or snapped and many power lines down. Widespread power outages in the hundreds of thousands expected for an extended period of time. Significant damage to many poorly constructed buildings. Mobile homes at risk. Wind-blown debris will make many roadways impassable.

Moderate

Potential for Moderate Impact: Trees and power lines blown down. Some structural damage to buildings possible with widespread power outages in the thousands; wind-blown debris blocking some roadways.

Low

Potential for Low but Concerning Impact: Minor wind damage possible, primarily to weakened trees, and loose objects. Isolated power outages.

The National Hurricane Center

BALTIMORE/WASHINGTON FORECAST OFFICE

- Compose and send Hurricane Local Statement
- Maintain public forecast while utilizing track and intensity estimates from NHC
- Expand NHC watches and warnings for marine and inland zones as needed
- Create impact graphics
- Work with core partners for decision support

NATIONAL HURRICANE CENTER – MIAMI, FL

- Generate tropical analysis and forecasts: this includes tropical cyclone position and intensity estimates (Hurricane Advisories)
- Coordinates watches and warnings for coastal zones
- Generates storm surge forecasts
- Performs tropical cyclone analysis
- Creates tools (such as models) for forecasting tropical cyclones

